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ABSTRACT

Biodegradable polymers are described comprising the recurring monomeric units shown in formula I or II:

$$\begin{array}{c} \text{I} \\ - \underbrace{\left(\text{X} - \text{M}_{\text{I}} - \overset{\text{O}}{\text{C}} \right)_{\text{x}}}_{\text{x}} - \text{Y} - \text{L} - \text{Y} - \underbrace{\left(\overset{\text{O}}{\text{C}} - \text{M}_{\text{I}} - \text{X} \right)_{\text{y}}}_{\text{P}} - \underbrace{\left(\overset{\text{O}}{\text{I}} - \text{X} \right)_{\text{y}}}_{\text{R}} - \underbrace{\left(\overset{\text{O}}{\text{I}} - \text{X} \right)_{\text{y}}}_{\text{x}} - \underbrace{$$

$$\frac{\left\{ \left[\left(X - M_{2} - C \right)_{q} - \left(X - M_{1} - C \right)_{r} \right]_{x} Y - L - Y - \left[\left(C - M_{1} - X \right)_{r} - \left(C - M_{2} - X \right)_{q} \right]_{y} \right\}_{n}^{Q} \right\}_{q} \right\}_{q} + \frac{C}{2} \left\{ \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{y} \right]_{p}^{Q} \right\}_{q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} \right]_{q}^{Q} \right\}_{q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} - \left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{C}{2} \left[\left(X - M_{1} - X \right)_{q} \right]_{q}^{Q} + \frac{$$

wherein X is -O- or -NR'-, where R' is H or alkyl; L is a branched or straight chain aliphatic group having from 1-20 carbon atoms; M₁ and M₂ are each independently (1) a branched or straight chain aliphatic group having from 1-20 carbon atoms; or (2) a branched or straight chain, oxy-, carboxy- or amino-aliphatic group having from 1-20 carbon atoms; Y is -O-, -S- or -NR'-, where R' is H or alkyl; R is H, alkyl, alkoxy, aryl, aryloxy, heterocyclic or heterocycloxy; the molar ratio of x:y is about 1; the molar ratio n:(x or y) is between about 200:1 and 1:200; and the molar ratio q:r is between about 1:99 and 99:1; wherein said biodegradable polymer is biocompatible before and upon biodegradat.

Processes for preparing the polymers, compositions containing the polymers and biologically active substances, articles useful for implantation or injection into the body fabricated from the compositions, and methods for controllably releasing biologically active substances using the polymers, are also described.